

CLAIMS:

1. Apparatus for measuring the depth of a data record layer in an information record medium having one or more data record layers, the apparatus comprising optical element means for focussing a beam of electromagnetic radiation on a data record layer, an actuator for moving said optical element means relative to said information record medium in response to a control current supplied thereto, focus error signal generation means for generating a focus error control signal for controlling said actuator so as to maintain said electromagnetic radiation beam focussed on said data record layer, and means for determining a control current supplied to said actuator at one or more zero-crossings of said focus error signal and determining therefrom the depth of said data record layer in said information record medium.
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2. Apparatus according to claim 1, wherein the optical element comprises an objective lens.
- 15 3. Apparatus according to claim 1 or claim 2, further including means for calculating a proportionality constant between actuator current and depth.
4. Apparatus according to claim 3, wherein the focus error signal comprises a substantially sinusoidal wave, and the proportionality constant is proportional to a
20 distance between two predetermined points on said wave.
5. Apparatus according to claim 4, wherein said two predetermined points comprise respective positive and negative peaks.
- 25 6. Apparatus according to any one of claims 1 to 5, wherein the information record medium is rotating, and the apparatus further comprises means arranged and configured to compensate for the resultant oscillation of the information record medium.

7. Apparatus according to claim 6, wherein said compensating means comprises means for causing the actuator to substantially follow oscillation of the information record medium.
- 5 8. Apparatus according to claim 7, comprising means for supplying the actuator with an oscillating current.
9. Apparatus according to claim 6, wherein said compensating means is arranged to cause the actuator to substantially follow any height variation of the information record medium due to rotation thereof.
- 10 10. A method of measuring the depth of a data record layer in an information record medium having one or more data record layers, the method comprising providing optical element means for focussing a beam of electromagnetic radiation on a data record layer, providing an actuator for moving said optical element means relative to said information record medium in response to a control current supplied thereto, generating a focus error signal for controlling said actuator so as to maintain said electromagnetic radiation beam focussed on said data record layer, determining a control current supplied to said actuator at one or more zero-crossings of said focus error signal and determining therefrom the depth of said data record layer in said information record medium.
- 15 11. Apparatus for calculating, in respect of an optical system, the depth of a data record layer in an information record medium having one or more data record layers, the optical system comprising optical element means for focussing a beam of electromagnetic radiation on a data record layer, an actuator for moving said optical element means relative to said information record medium in response to a control current supplied thereto, and focus error signal generation means for generating a focus error control signal for controlling said actuator so as to maintain said electromagnetic radiation beam focussed on said data record layer, the apparatus being arranged and configured to determine a control current supplied to said actuator at one or more zero-crossings of said focus error signal and to determine therefrom the depth of said data record layer in said information record medium.
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12. A method of calculating, in respect of an optical system, the depth of a data record layer in an information record medium having one or more data record layers, the optical system comprising optical element means for focussing a beam of electromagnetic radiation on a data record layer, an actuator for moving said optical element means relative to said information record medium in response to a control current supplied thereto, and focus error signal generation means for generating a focus error control signal for controlling said actuator so as to maintain said electromagnetic radiation beam focussed on said data record layer, the method comprising determining a control current supplied to said actuator at one or more zero-crossings of said focus error signal and determining therefrom the depth of said data record layer in said information record medium.

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13. Spherical aberration compensating apparatus including apparatus according to any one of claims 1 to 11.

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14. An optical data recording or retrieval system including spherical aberration compensating apparatus according to claim 13.